task to fill it, had it been held by a man of far smaller intellectual calibre. The administrative work alone would tax the abilities of our greatest corporation heads, while the outlining of its courses of study calls for educational statesmanship of the first rank. . . .

In President Eliot's case, he has borne the multifarious burdens, including the duty of meeting with the governing bodies and the faculty, at the expense, we are tempted to say, of the student body. By this we mean no criticism; it is a fact, however, that he has generally been a stranger, or a great name, to the undergraduate body. Close relations with it have been humanly impossible; all one could ask was the necessary intercourse with the leaders of the teaching staff of *only* 566 persons. So when one of the leading undergraduates was asked by a reporter the opinion of that body as to the president's retirement, he naïvely answered to the effect that "few of us know him, but all regret the change"! True, Mr. Eliot has for some years past annually met the newly entering class with one of those exquisite addresses of counsel and inspiration that will have high place among the enduring monuments he has, unconsciously enough, builded to himself. But beyond that the influence of his noble personality and his lofty personal life have penetrated to the undergraduate hardly more than to the general public all over the country. This has been a grave loss to college and nation, for the moulding of character is, after all, the primary duty of a university; even of a teacher of science, as Professor Arthur A. Noyes of the Institute of Technology admirably points out in the current SCIENCE. "To begin with," he says, "we [the teachers] set him [the student] the example of rendering unselfish service to others by giving him individual aid. . . ." And it is individual moral aid that the Harvard student often so sadly lacks. Who in our time has been better fitted to extend it than President Eliot?

Then there is the faculty. It takes a great general to inspire 566 teachers; to recruit their forces, to recognize the worthy and discard the drones or the inefficient; to lead them on over the breastworks of tradition to new fields of honor and of service. That would seem in itself to be a sufficient life's work for any one man. And so we confess to having been surprised to learn last year that a majority of a joint committee of the Overseers and the corporation, including President Eliot, found, after inquiry, that "the president of the university does not need to be relieved of any function that he now performs; but that he ought to be relieved of details in many directions, and to have more assistance than he now has." Would they have been able to report the same with any one else as president? Will the governing boards not yet come to filling President Eliot's place with two men, one a rector in charge of everything pertaining to the scholastic work, the students, and the teachers, and the other a man of the type of the late William H. Baldwin, Jr., of the Long Island Railway, of marked business ability, of winning and upright personality—qualified to represent the university in all of its relations to the public and the nation?—New York *Evening Post.*

SCIENTIFIC BOOKS

First Course in Biology. By L. H. BAILEY and W. M. COLEMAN. New York, The Macmillan Co. 1908.

The present work is divided into three parts, the first of which is devoted to botany and is written by Professor Bailey, while the second and third parts dealing respectively with zoology and physiology are by Professor Coleman. As is remarked in the preface, there is a tendency in secondary education to introduce unit courses in biology in place of isolated courses in botany, zoology and physiology, and the authors have aimed to prepare a book which presents the elements of biology as exemplified by plants, animals and man, rather than separate treatises on different fields of biological science. The book is designed to afford material for three half years, but the ground may be covered in a single year by omitting the matter in fine print.

There is a useful introductory chapter on the elementary facts of chemistry which are essential for the understanding of the bio-

logical discussions which follow. Then the student is plunged at once into accounts of variation, struggle for existence, survival of the fit, and plant societies—topics which more frequently form the end, instead of the beginning, of text-books, although as here presented they can readily be grasped by the beginning student and may serve to enliven his interest in and appreciation of what is to come. Most of the botanical section is devoted to the structure, physiology and adaptations of flowering plants, the cryptogams being dealt with in the last chapter in fine print which is designed to be omitted should time not be adequate for the complete course. Many teachers may criticize the limitation of the work so largely to the flowering plants and the inadequate conception it gives of the diversity and general development of the vegetable kingdom. One must of necessity sacrifice important subjects in an elementary text, and it is quite natural that the writer who stands so prominent as an authority in horticulture and agriculture should emphasize, perhaps unduly, those parts of the subject which are more directly concerned with these branches. Professor Bailey has brought the student more closely in touch with the practical aspects of botany than is usually done, and this is a valuable feature of his part of the book, even from the standpoint of the teacher of pure science. The text is clearly written and illustrated with many good figures most of which are new, and there are lists of questions and helpful suggestions for work at the close of the various chapters.

The zoological part of the work suffers considerably in comparison with the preceding. Errors are numerous and frequently serious, while there are many more statements which are misleading or inadequate. Space will not permit us to point these out in detail, but the following will serve to indicate sufficiently, I think, the general character of the work. After describing *Amœba* and *Paramœcium* we have the statement: "Other classes of Protozoans are the infusorians, which have many waving cilia (Fig. 17) or one whip-like flagellum (Fig. 18), and the foraminifers which possess a calcareous shell pierced with holes (Fig. 19)." In the first place the infusorians do not, as the statement implies, form another class in addition to that represented by *Paramœcium,* they do not in most recent systems of classification and certainly should not include the flagellata, many of which have two or more flagella instead of one; nor are the foraminifera ranked as another class distinct from the rhizopods to which *Amœba* belongs, but as a subordinate division of the same group; they do not all possess a calcareous shell; in large numbers of species the shell is not pierced with holes; and the figure which is supposed to represent one of them is a picture of a radiolarian!

In Fig. 23 what are called the eggs of the fresh-water sponge are doubtless the gemmules. After informing us that in sponges "the ciliated cells and the reproductive cells are the only specialized cells," and that "slow-growing sponges grow more at the top and form tall, simple, tubular or vase-like animals. Fast-growing sponges grow on all sides at once and form a complicated system of canals, pores, and oscula," we are given an illuminating account of how sponges may have arisen from unicellular ancestors.

> Several one-celled animals happened to live side by side; each possessed a thread-like flagellum or whip-lash for striking the water. By lashing the water they caused a stronger current than protozoans living singly could cause. Thus they obtained more food and multiplied more rapidly than those living alone. The habit of working together left its impress on the cells and was transmitted by inheritance. Cell joined to cell formed a ring; ring joined to ring formed a tube which was still more effective than a ring in lashing the water into a current and bringing fresh food (particles of dead plants and animals) and oxygen.

Comments are superfluous.

In the description of the nettling cells of hydra the fact is announced that after their discharge "when the pressure is withdrawn the thread goes back as the finger of a glove may be turned back into the glove by turning the finger outside in." In the same chapter occurs also the misstatement that "the hydra is the only fresh-water representative" of the "branch polyps (sometimes called Cœlen-

terata)." And the figure of hydras on pondweed is inverted, giving one the impression that animals are growing on the stems up in the air.

In the chapter on Echinoderms the following sentences are from one point of view very instructive: "The sand dollars are lighter colored than the sea urchin. Why?" Here the bright pupil is probably expected to hold up his hand and, without ever having seen a sand dollar, much less observed one in its natural habitat, explain the matter, after the common fashion, as a case of protective coloration. The explanation fits the case all the better if it is not known that many species of sand dollars when alive in the water and still containing a large amount of purple pigment are anything but light colored and do not become so until they are bleached out or denuded of spines or both. "Starfish," the author tells us, "are brown or yellow. This makes them inconspicuous on the brown rocks or yellow sands of the seashore." In this as in several other cases the author seems naïvely unaware of the danger of making general statements on the basis of a few instances. Only a slight investigation of the colors of different starfish would make him acquainted with species of red, orange, purple or other color of the most conspicuous kind, and would doubtless have shaken his faith in the general occurrence of protective coloration in this group. The flat form and light thin walls of the sand dollars are explained as an adaptation to prevent their sinking into the sand. This may be the case, but the author is a little venturesome when he relates that "the five-holed sand cake or sand dollar has its weight still further diminished by the holes, which also allow it to rise more easily through the water." Whether he conceives these creatures to have the faculty of rising and swimming about like fishes is not entirely clear, but the possession of some means of locomotion above the bottom seems to be implied.

In regard to the common earthworm whose structure is correctly described in so many text-books it is surprising to find the author falling into several errors. The eggs are said, on page 46, to pass out of two pairs of openings in the fourteenth and fifteenth segments, while on page 47 they are said to pass into the collar-like case as it passes the fifteenth and sixteenth segments—two contradictory statements, neither of which is correct. A structure marked *ES* in Fig. 77 is called egg gland, while other bodies marked o_1 and o occurring in the twelfth and thirteenth segments respectively are not given any further explanation. The word clitellum is employed for the chitinous capsule which surrounds the eggs instead of the glandular region of the body by which the capsule is secreted.

After warning us that "the name 'worm' is often carelessly applied" and that it should be given "only to segmented animals without jointed appendages" we are given a classification of the "four classes in the branch Vermes," two classes of which, the roundworms and the rotifers, are not segmented forms at all, while in the third class, the flatworms, segmented forms occur only in one of the subordinate divisions. The first class is designated "*earthworms,* including sandworms and leeches," which is something of a sacrifice of accuracy to simplicity of terminology.

On page 79 we meet with the statement that:

> It is probable that the large or compound eyes of insects only serve to distinguish bright objects from dark objects. The simple eyes afford distinct images of objects within a few inches of the eye.

It would be difficult to give an account more at variance with the facts, and we recommend the perusal of Forel's "Expériences sur les Sensations des Insectes" before the issue of a second edition. On the same page occurs a section upon "Inherited Habit or Instinct," in which the mode of origin of instincts is described and summarized in the sentence "Repeated acts constitute a habit, and an inherited habit is called an instinct." We do not criticize the writer for espousing a view of the origin of instincts now largely discredited and accepted by practically none in the unqualified form here set forth, but if the subject is discussed at all the student should not be given but one interpretation and taught dogmatically that it is the correct one. The table for classi-

fying insects on page 82 contains many errors; statements either the reverse of the truth or otherwise faulty occur in six out of the ten short diagnoses of the orders.

The inaccuracies, of which many more examples could be pointed out, are not the only features that call for criticism. They constitute rather a symptom of debility in other directions. Students of science will gain little profit from a book in which there is a lack of clearness and cogency of thought, and the choice of the text in its present condition for a class in zoology would be one to be deplored.

In dealing with physiology the author is apparently more at home. At least there are fewer errors. There is, however, a very inaccurate original diagram of the sympathetic nervous system, and there are several statements that require emendation. The outlines for practical laboratory experiments form a commendable feature of this part of the work, and the general plan of having physiology follow a course in zoology leading gradually up to the study of man is an excellent one, but it is regrettable that it should have fallen so far short of the ideal in its execution.

S. J. H.

Typhoid Fever. Its Causation, Transmission and Prevention. By GEORGE C. WHIPPLE, Consulting Engineer. With an Introductory Essay by WILLIAM T. SEDGWICK, Professor of Biology, Massachusetts Institute of Technology. New York, John Wiley and Sons; London, Chapman and Hall, Limited. 1908.

The publication of a work by a layman on a subject usually regarded as medical is something of an innovation, and a welcome one. It is curious that the preventable diseases, which from the prophylactic standpoint present so many aspects of a technical, but not a purely medical, character, have not been discussed more frequently by sanitarians in works, like this of Mr. Whipple, which are in a form which commends them to the general reading public. The medical profession has often been accused, and justly so, of being too secretive regarding medical affairs. There is an undoubted and salutary reaction within the profession against this policy of secretiveness, and books like Mr. Whipple's will help along this reaction.

Mr. Whipple's work does not go into details regarding the purely clinical aspects of typhoid fever, but merely sketches this side of the disease, and relates for the most part, as the subtitle indicates, to the causation, transmission and prevention of the disease. These subjects are covered in a series of chapters dealing with the life history of the typhoid bacillus within and without the body, the lines of defense against its entrance, statistics dealing with the distribution and epidemiology of the disease, its relation to water supplies, and a brief chapter on the financial loss caused by its prevalence. Useful appendices deal with the use of disinfectants, the rôle of house flies in the spread of the disease, death rates, water analysis, the viability of the germ, and the literature of the subject. The book is well printed, and is admirably illustrated by numerous charts, and an ingenious frontispiece which shows the methods of transmission and means of protection.

The work differs from most of those available to the public in the simplicity of its language, which can be understood by any intelligent layman. It differs from most medical treatises on Typhoid Fever in the emphasis placed on the transmission and prevention of the disease, and in the wealth of statistical detail available to support the various statements. We could have wished that there was more in the book concerning what has actually been accomplished in the prevention of the disease when due to contact rather than water or food transmission. Koch's work at Trier, which shows what can be done to stamp out the disease under certain circumstances, might have been quoted. Though Mr. Whipple's profession naturally impresses upon him most forcibly the dangers of water and food transmission, he recognizes the importance of contact, but does not, we believe, emphasize it so forcibly as is desirable. In the main the work is an admirable one, and worthy of the highest commendation. Professor Sedgwick's introduction is an interesting historical summary of the development of our knowledge of the disease.

GEORGE BLUMER